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The New Focus in International Manufacturing and Trade

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Logistics management (to improve asset productivity and respond more quickly to volatile changes in customer preferences) enables many organizations to conduct their business with minimal inventories — by outsourcing intermediate production to enterprises in countries where factor costs are lower. Developing countries can capitalize on these trends only if they substantially improve their infrastructure, liberalize their regulations, and master modern logistics management techniques.

This paper — a product of the Transport Division, Infrastructure and Urban Development Department — is part of a larger effort in the Department to establish an effective framework for helping developing countries adjust to changing logistics management practices in international markets. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Arlene Elcock, room S10-029, extension 33743 (August 1992, 28 pages).

Major breakthroughs in communications technologies in the 1980s made it possible to monitor all phases of moving a product from raw material sourcing through processing through delivery to the customer. Close monitoring revealed major inefficiencies in the traditional set-up of materials acquisition, production, and distribution — especially large inventory holdings. At the same time, patterns of customer demand began to shift more rapidly, partly because of better communication networks.

The need to reduce costs and become responsive to volatile changes in customer preferences forced businesses to substantially restructure their corporate practices. With domestic factor costs rising, manufacturers outsourced intermediate production to foreign enterprises in countries with lower wages and merchants sought cheaper supply sources — developments that held promise for developing countries.

Many developing countries have been unable to take advantage of structural changes in world manufacturing and trade because they have been unable to deliver the quality of production, fast turnaround, and reliability of delivery manufac-

turing businesses need to keep up with changing market demand.

A new management approach — logistics management — is needed to cut business costs and to be responsive to rapidly changing markets. Logistics management orchestrates materials acquisition, production, and marketing to reduce inventories (the heaviest burden on corporate performance) to a minimum. Effective logistics management enables many organizations to conduct their business with less than a week's worth of supplies.

Such a radical change requires major corporate restructuring and the development of strategic alliances with service providers. Outsourcing of production is projected to continue growing, and the search for less costly supply sources will continue.

Developing countries can capitalize on those trends — but only if they substantially improve their infrastructure, liberalize their regulations, and begin to apply modern logistics management techniques. If they don't, their outlook is not promising.

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I. INTRODUCTION

1. During the last decade it became increasingly evident that some fundamental and hitherto largely unknown developments had started to exert their influence on industrial performance, the growth of trade, and the organization of the service sector in many countries. The root causes of such developments seemed to point to radical changes in the management of manufacturing and marketing processes. Materials acquisition, production, and the distribution of finished goods to consumer markets took place in ever shorter time intervals. Effective market shares of individual businesses appeared to be more and more a function of a firm's ability to produce and sell in close relation to changing consumer preferences. All indications suggested that market demand was becoming much more volatile than at any time before.

2. While initially these observations appeared to be merely applicable to industrialized countries, there were nevertheless indications that such tendencies were gradually spreading throughout the world economy, engulfing manufacturers and traders indiscriminately. Businesses in a growing number of developing countries experienced unexpected impacts on corporate performance. These impacts were manifested through stagnant, and often declining market shares, and thus deteriorating export performance. But at the same time unrelenting cost pressures caused factor inputs to become increasingly expensive in industrialized countries which created opportunities for manufacturers in developing countries to enter lucrative consumer markets. One could also register growing interest in industrial circles within North American and West European countries, as well as in Japan, to team up with manufacturers in developing countries in order to take advantage of their low factor costs and their abundant labor pool.

3. A few developing economies, notably those along Asia's Pacific rim, seemed to lodge some success in capturing these new opportunities. However, governments and businesses in the majority of developing nations appeared to be at a considerable loss when it came to taking required affirmative action. Their difficulties in arranging for effective responses were a reflection of not being able to grasp and thus to internalize the consequences of technological progress and increasingly volatile market behavior, and to corresponding changes in the management of manufacturing and sales processes. What appeared to be particularly difficult to adjust to were the strategies adopted within the international service industries in reaction to changing practices in manufacturing and trading. Much more explicitly than in the past, industrial success depended on highly efficient provision of supporting services. In this context, effective transport and telecommunications arrangements, both from an infrastructure and service organization point of view, gained special importance.

4. As these circumstances have the potential of dictating much of the future pace of economic progress in many developing countries, it had become apparent that there was a need to investigate more closely the

causes and effects of changing international practices in manufacturing and trading. On the basis of such an assessment it would then be possible to draw up strategic guidelines which would enable governments and businesses in developing countries to adjust more effectively to the continuous restructuring in the international market environment. The survey was organized by the Transport Division of the Bank's Infrastructure and Urban Development Department. Its findings will form key inputs to a proposed policy paper which will set directions for related assistance.

5. Since more than 80 percent of exports from developing countries are targeted for markets in the ten principal OECD economies,¹ it was considered appropriate to concentrate on industrial and trading practices, as well as consumer behavior in their markets. Only limited comparative international analysis was available, and related statistics were scarce. Therefore the need arose to develop an extended network of cooperation with qualified research institutes and business organizations in each of these countries. Within the cooperative framework that emerged, several organizations have to be singled out because of their special contributions. They include:

- * the Council of Logistics Management (United States), and through its good offices Michigan and Ohio State Universities;
- * the Bundesvereinigung für Logistik (Germany) and by virtue of its intervention the Technical University Berlin, and the Bremen Institute of Shipping Economics and Logistics;
- * the Rijks Universiteit in Antwerp (Belgium), and the Erasmus Universiteit in Rotterdam (the Netherlands);
- * the Japan Maritime Research Institute in Tokyo (Japan), and the Instytut Morski [Institute for Maritime Economics] in Gdansk (Poland);
- * the Lloyd's of London group, especially their office in Hong Kong;
- * the Van Ommeren trade and transport conglomerate, and the A.T. Kearney management consulting practice, both through their branches in different countries; and
- * the International Chamber of Commerce in Paris (France), as well as the International Federation of National Freight Forwarders' Associations in Zürich (Switzerland).

¹ Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, the United Kingdom, and the United States of America.

6. Through these cooperative efforts it was possible to survey 1,450 businesses in various categories of manufacturing, in wholesaling and retailing, and representing different segments of the service industries. In the latter context, special emphasis was on transport, warehousing, and information processing. The overall objective was to determine how all these businesses had progressed through the 1980s, as regards either their manufacturing and marketing arrangements, or their service offerings. In addition, business managers were asked how they project further developments in these respects throughout the 1990s. This report synthesizes the related findings. The questionnaires and more detailed descriptions of what was learned were published by the Council of Logistics Management in the United States, and by the Technical University Berlin in Germany.²

II. CHANGES IN INTERNATIONAL TRADING AND INDUSTRIAL RELATIONS The 1980s in Retrospective.

7. During the past decade, growing labor and other factor costs in many countries reached proportions which made it uneconomical to pursue conventional manufacturing arrangements in local industries. Therefore these industries sought cost advantages to defend or expand their market shares by outsourcing the manufacture of components or entire product lines to foreign partners located in countries where they could achieve cost economies in factor input markets, such as labor. Equally important, wholesalers and retailers in many countries started to set up direct purchase arrangements in overseas markets for products or components which they could no longer procure cost-effectively in their domestic markets. Many of these wholesale and retail organizations became firmly committed to off-shore sourcing arrangements which were not amenable to short-term modification. In the rapidly changing markets which became characteristic of the 1980s, the risk was significant that goods procured under traditional arrangements might be inadequately supplied, and might be obsolete or incorrectly styled, when delivered. As manufacturing and trading firms increased their international operations, exacting transaction arrangements became increasingly important (see Box 1 on page 4).

8. Possibly the most important dimension of the market changes during the 1980s was a fundamentally different environment which influenced

2 Council of Logistics Management: (1) Leading Edge Logistics. Competitive Positioning for the 1990s; Michigan State University; (2) Customer Service: A Management Perspective; Ohio State University; and (3) Partnerships in providing Customer Service: A Third Party Perspective; Ohio State University. Technical University Berlin: Trends in der Logistik; Baumgarten, H. and Zibell, R.

BOX 1

GLOBAL SOURCING

Global sourcing - the purchase of materials from a worldwide arena to procure required products at the lowest price - became an essential ingredient of competitive strategies in the marketplace of the 1980s. The question was no longer whether to go global, but when. The challenge was to capture the benefits of global sourcing and leverage them into competitive advantages wherever possible, while minimizing costs and risks.

Traditionally, the most widely recognized benefit of global sourcing had been lower costs. Less expensive labor, less restrictive work rules, and lower land and facility costs have enticed businesses and to foreign suppliers since the early 1970s. Traders and manufacturers generally reported that they could obtain comparable quality goods at lower costs from foreign sources. Tax advantages reduced costs further. However, there was growing recognition that lower costs were no longer the only benefit of global sourcing. For many firms, the payoff increasingly came from product availability, uniqueness, and quality. Many European and North American businesses sourced globally in essence to strengthen the reliability of their supply. They looked to worldwide markets to supplement their domestic sources and to meet an increase in product demand. There were also cases where a company simply could not get the materials it needed from domestic sources. For example, most U.S. products using small motors are fitted with supplies from Asia because few other regions can produce such devices cost-effectively. Similar patterns can be observed elsewhere in situations where the technical specifications or capabilities of products manufactured overseas exceed those of domestic units. Finally, quality is joining costs as a lure to overseas purchases. In Japan, the U.S.A. and several West European countries, companies realized that in a significant number of cases, foreign sourced raw materials and finished products were generally of higher quality than domestically produced goods.

High product quality, improved product availability, and lower costs will continue to spur conversions to global sourcing, but leading companies have started to focus on an even more fundamental edge: sustainable competitive advantage. The potential for a lasting advantage lies in three areas - technical supremacy, penetration of growth markets, and high speed. Companies gained technical supremacy by securing access to innovative technology developed overseas and locking out competitors from the technology base. A foothold in a promising market was obtained by sourcing in that market. Important considerations were restrictive quotas and local content requirements. By adjusting product components to avoid local content restrictions and other trade barriers, the global sourcer could enter a lucrative protected market before his competitors. With time-to-market emerging as a new competitive battlefield, the flexibility and global reach of a company's sourcing network became critical. Slow and unresponsive sourcing undermined the best marketing strategy. A well established global sourcing program, on the other hand, could provide a strong foundation for a speed advantage.

consumers' preferences and corresponding seller responses. For one, due to expanding media networks, the world's population learned of new products in the market. The result was global commonality; people became willing to sacrifice traditional product preferences for higher quality and lower priced goods. But exposure to information about new products available in the markets has also spurred fast changes and growing diversity in demand. In short, consumers became more selective and also more capricious. Increasing disposable incomes tended to reinforce these trends. Sellers came to realize that they had to be very responsive to fast changing consumer preferences. These developments, in turn, induced a revolution in the way business was conducted. While product quality and cost were still important competition variables, responsiveness to fast changing market demands and quick supply arrangements became the quintessential factor for gaining and expanding market shares. Instead of 'cheaper and better', the new theory suggested that many firms would prosper most by concentrating on 'quicker'. The cutting edge firm was actively exploring new and faster ways to go to the market.

The Growing Importance of Customer Service

9. Customer service reached new levels of importance, and market success was much more driven through service differentiation than product differentiation, as had been the case in the past. In short, quality of service became the key determinant in the marketing mix. In addition, customer service was increasingly recognized and treated as a concept of broad strategic importance. Effective customer service spanned geographic boundaries and allowed global integration of a customer-driven marketing strategy. It has to be understood that the concept of customer service was not limited to the end consumer but equally encompassed industries or traders who acquired merchandise for further processing. Such merchandise could be intermediate products, components, or completely assembled modules.

10. While consumer demands broadened, requiring a wider selection of products, product and service providers, in turn, required more from their suppliers. Industrial buyers rated distribution service at least equal to product quality, and both higher than price. In most cases, they would cancel an order when they found an item not to be available when ordering. Sellers, almost by definition, had to have an acceptable interface with customers if they were to survive beyond the short run. They had to search for and find some way of providing at least a threshold level of service for their core customers. As a strategic response, many firms chose to differentiate their products not on the basis of a product itself, but on the basis of the service which surrounded the delivery of that product. Over the last ten years, the opportunity to augment or even to replace product differentiation with service differentiation has been seized by increasing numbers of firms.

11. During the early stages when a product was truly unique, and customers had no alternative, the usual argument was that customer service was a less important factor in the marketing mix. But as a product matured and competitors entered the market with substitute products, customer service gained even more importance as a determinant of market share. For instance, in the chemical industry where products are bought by detailed specifications, a company that could deliver the product according to specifications and on time usually got a larger share of the market. Thus customer service became a primary means of differentiating products which the buyer viewed as largely substitutable. It allowed the seller to develop strategies which were basic to developing and defending market niches. When a product became more generic in nature as a result of technology-information diffusion, and as it became easier for a customer to turn to other vendors to obtain a close substitute product, the importance of service to market share outcome increased even further.

Response Strategies in Manufacturing and Trading

12. During the 1980s, the strategic response in industry and trade circles to changing market demands has been to fundamentally alter their approach to manufacturing and selling. In fact, one could observe almost complete reversals in industrial attitudes and behavior. Since the industrial revolution the focus had been on economies of scale, achieved through mass production, which resulted in low unit costs for a limited line of products accumulated in huge inventories in anticipation of sales. It was basically a 'supply push' arrangement. The changes in sales markets taught managers that they had underestimated the extra price consumers had become willing to pay for variety and timely delivery. Secondly, those who focused on economies of scale in production and distribution often ignored the potential for savings in inventory and working capital, which can best be tapped by speeding production and sales processes. Based on these insights, trade and industry managers began to concentrate on using time and variety as a strategic counter to competitors' lower prices and higher volumes. This strategy implied production and sales in direct response to constantly changing market demands. One had come to realize that industry must respond in a way that allowed for customization in a previously standardized world. The 'demand-pull' concept, pioneered in Japanese industry over 40 years ago (see Box 2 on page 7), was increasingly adopted. It stands for pulling materials through the system just-in-time (JIT) only as and when they are required. Traders, wholesalers and retailers employed their own version of JIT, called 'quick response', to shorten order cycle times. The experience to date suggests that JIT systems forced a closer relationship between buyer and seller in a number of different ways.

13. Increasing asset productivity is the most important goal in corporate strategy. One valuable way to view asset productivity was to

BOX 2

KANBAN - A REVOLUTIONARY CONCEPT IN MANUFACTURING

Over 40 years ago, a Toyota engineer by the name of Taiichi Ono initiated a new procedure which became synonymous with a revolution in production line control. It introduced a 'pull' concept in manufacturing processes in favor of the erstwhile sacrosanct 'push' concept. By the 1940s the 'push' concept had become a fundamental tenet of the world's leading car manufacturers. But in 1948 Toyota broke ranks with the entire industry and began questioning its wisdom. Instead of having suppliers and production forecasts push materials and parts through the line, would it not be better for final assembly lines to 'pull' them through the system? The main task at hand was seen to prevent unwanted build-up of inventory off the production line, which could only be ensured by producing in small lots and by regulating rigidly the flow on the line itself. It was therefore necessary to eliminate on-line accumulation and, if possible, do away with the need for buffer inventories.

Toyota began by first producing parts in lots as small as possible, adequate only to meet the immediate needs of the subsequent station on the line. The key to making small-lot production economical was low lead times. This could only be achieved by minimizing the time to set up the machinery and dies for different jobs, and by introducing strict pre-production preparation to eliminate production of defective parts to the greatest extent possible. Once Toyota had achieved this, small lots facilitated production of an expanding model range in limited volumes and actually lowered the costs by reducing inventory and fixed investment. It was then necessary to ensure that the limited supply of parts flowed without hindrance down the line. Toyota tackled this requirement by reversing the information flow. Rather than having final output of finished products determined by the capacity of suppliers to feed parts, as in the traditional 'push' systems, the ultimate control over the system was to be the capacity of the final assembly station to absorb parts. The 'pull' system effectively became a just-in-time arrangement, as parts were turned out only at the moment when required for the next operation.

In all this there was a need for some kind of regulatory control over the flow of worker-initiated commands. It was to give order to the system that small pieces of paper were introduced, exchanged manually by workers and affixed to component containers. These signals were called Kanban. In the kanban system, the number of ordering and withdrawal kanban for each component was predetermined. In-house withdrawal kanban accompanied parts in transit from one station to the next, while kanban orders informed workers or subcontractors of the time and place of delivery. The exchanges of kanban controlled production of parts rigidly, depending on the number of kanban and the frequency in which they were exchanged.

Although kanban were only part of an integrated system, by the late 1970s Toyota's entire gamut of production techniques was being dubbed the kanban system in deference to their central role. Besides identifying each component and vehicle, kanban served to highlight and thereby to eliminate any weaknesses in the production line. Signs of inventory build-up meant overproduction, defective parts production was immediately apparent as buffer inventories were minimal, and the movement of defects or assembly mistakes down the line was impossible as they would be rejected by the subsequent work station. Through gradual reduction of the lead times and lot sizes, Toyota managed to almost eliminate on-line inventories and cut orders placed to just one day's supply.

relate aggregate inventory holdings to industrial output. In the past, a primary reason for which businesses held inventory was to provide customer service, and for a long time they sought to improve such service by raising inventory levels. If sufficient inventory was accumulated at enough stocking points, then shifts in production schedules or marketing emphasis did not result in stockouts and a consequent deterioration of customer service levels. In the absence of any functional integration within a firm, and with limited ability to monitor changes in market demand, the natural solution was inventory accumulation. However, high cost of capital made this an increasingly ineffective method of improving service. The costs of carrying inventory includes not only interest but also the costs of obsolescence, spoilage, insurance, facility management and depreciation, and taxes. While manufacturers' traditional view of inventory had been as that of an asset, under JIT, inventory became a liability. For many firms, inventory commitment far exceeded net worth, and typically represented between 30 percent and 50 percent of their short-term borrowings. Thus the soundness of inventory management was often the difference between success and failure in the market during the 1980s.

14. The past decade has been a period of significant change in both the structure of international businesses and the concentration of markets. A trend emerged to 'flatten' business organizations. The overall intention to implement flatter corporations in an effort to increase flexibility and reduce costs has forced the delegation of authority down the organization closer to the customer. The leaning or flattening of the organization has also stimulated outsourcing. The streamlined firm became flexible. It was able to direct limited assets to areas of maximum yield, concentrate on its core business, and leave areas beyond its expertise to specialty firms. This strategy implied the benefits of off-balance sheet financing. The redeployment of assets was for many firms a new, and at times difficult management philosophy. It was diametrically opposed to conventional wisdom which dictated corporate ownership and control of most, if not all the assets utilized in production and marketing processes.

15. The new, more hollow corporation became inclined toward the development of partnerships with material vendors and service providers. The result was an extended corporate network of strategic alliances between buyers and providers of key services and materials. Many suppliers forged such strategic alliances with their customers which involved joint design and development of products and services in return for long-term purchase commitment. The nature of relations between manufacturers and traders, on the one hand, and the transport industry, on the other hand, became an important determinant of success. Under the pressure to rationalize, the functions of transport and management of inventories in transit had to be increasingly integrated into manufacturing and sales processes. This became necessary as with rapid technological advances, which enabled increasing automation and more effective control of production, the share of distribution expenditures in relation to total product costs became more prominent.

Information - The quintessential Factor

16. Information became the essential requirement for effective management of the purchase, manufacturing, and sales processes. Real-time and on-line information was needed to track shipments, to monitor production status and inventory levels, and -most importantly- to measure customer preferences and thus changes in market demand. An increasingly important aspect of customer service was providing business partners with order status information. The importance of communication within the supply chain became a critical link in establishing consensus on customer service performance. It is for these reasons that the value of a product or service increasingly arose not from the material item itself but from the information that surrounded it. Companies increased the use of information technology to enhance and differentiate their products while making their offerings more accessible to industrial customers and consumers. In doing so, they added value through information in order to instill a sense of quality in their products and services. In short, they were using information as a strategic tool.

17. During the 1980s, it became possible to fashion interactive data bases through which customers could query a supplier's information system and track a specific shipment nearly anywhere in the world. The technology available to measure and manage the customer service function expanded almost exponentially. In many areas technology moved so fast that it became difficult to know the right time to make a procurement decision. A decision made too early saddled a system with potentially obsolete technology, while a delayed decision often resulted in non-competitive systems. Profitable companies were separated from less successful ones on the basis of their technology choices and their ability to integrate these choices into their operating fabric without serious disruption of their strategic objectives.

18. The substitution of information for inventory and other resources had become a way to improve service while keeping costs in check. This substitution has been made possible by the increasing affordability of computers, and by electronic data interchange (EDI) systems. All the traditional resources available for production have increased in costs over the last fifteen years but the costs of information have decreased. The growth of EDI as a means of communicating between firms is perhaps the most pervasive change to affect international business practice in recent history. Firms moved into EDI primarily because customers were increasingly forcing suppliers to be part of their EDI information systems. In many cases, enhanced productivity, improved sales, and, notably, reduced costs of ordering and carrying inventory resulted in benefits which enabled full depreciation of acquired EDI systems in less than one year.

III. LOGISTICS MANAGEMENT

The New and Key Determinant of Success in Industrial Performance and in Trading.

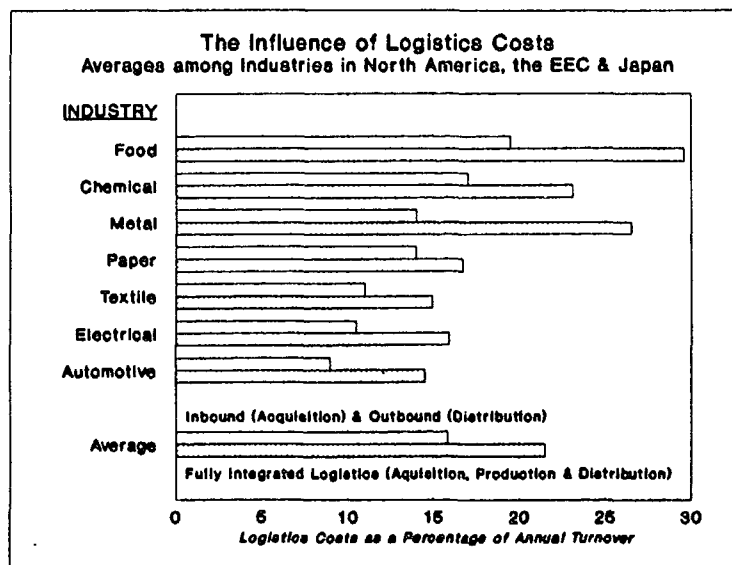
19. During the past decade, businesses did not only have to face growing competitive pressures from domestic and foreign firms, but also from product proliferation. As these pressures built up, trading and industrial enterprises were forced to search out less traditional ways of creating competitive advantage. In all this, attaching a package of services to a product became a vitally important measure of differentiating a firm's offerings which could not be as easily copied as changes in price or promotion, or product modifications. The thrust behind new management efforts was focused on orchestrating the acquisition, manufacturing and sales functions. The applied strategy was logistics management.

The Concepts

20. Manufacturers, wholesalers and retailers exhibited similar organization structure, strategic posture and management behavior when it came to logistical practice, despite significantly different overall business missions and objectives. Logistics became a broad management concept which bridged time and space, and encompassed all functions related to purchase, manufacturing and sales. The key word to understanding the potential of logistics was integration. Recognition that an increasing number of firms gained competitive leadership in industry after industry, based on their logistical competency was sufficient to attract widespread attention. In the period since 1980, many companies increased their use of logistics management as a competitive weapon to secure and maintain customer loyalty. They sought to leverage logistical competency to gain and maintain competitive superiority. In pursuing this strategy they added value to the products and services they marketed, supporting this goal by operating a cost-effective logistics system.

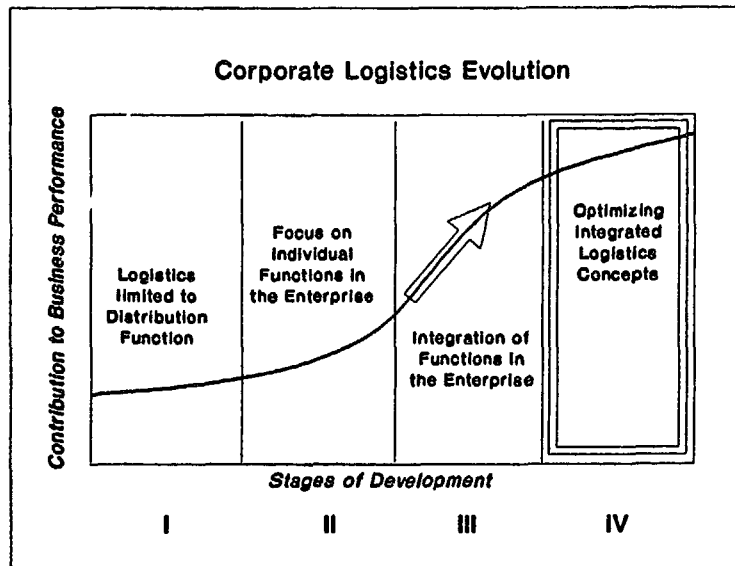
21. Logistics is that aspect of business operations concerned with strategic positioning of inventory. In many industries, managers came to realize that possible efficiency potentials in manufacturing processes had been largely exploited. At the same time, they became very concerned about the excessive time lapse experienced by individual products between raw material source and retailing.³ There was growing recognition that prevailing practices of treating production, storage, transport, and information flows separately would have to be replaced with boundary-spanning systems planning. Only in this way, the potential for rationalization, inherent in modern materials management concepts and data processing technologies could be tapped. With their new flexible response

3 In West European industries this span typically involved two percent of the total time in production, five percent in transport, and during the remaining 93 percent of the time a product was in storage at the various stages of processing.



23. As the 1980s went by, logistical practice began to change more fundamentally, prompted by extreme profit pressures from domestic and foreign competition. Industries besieged by such pressures were the first to revamp their logistical practice. Within these threatened industries, a small group of progressive firms began to rise to the top by reaping the benefits of improved logistical performance. Their management had recognized the benefits attainable through state-of-the-art logistics competency, and this awareness was growing. In essence, three circumstances acted as catalysts to create unprecedented opportunity to exploit the benefits of logistics excellence: exploding technology, structural changes in business organization and the local economies, and the globalization of markets. In some countries, liberalizing measures introduced in government regulations provided facilitation, basically by removing infrastructural and service barriers to efficient competition in the transport and telecommunications sectors. The net result of a more permissive political environment was the creation of greater opportunity for logistics to take an active role in competitive practice.

24. Businesses moved through four distinct stages in organizing the provisions for managing their logistical support systems (see graph on page 13). During the second half of the 1980s, shippers augmented their focus on intensively managing logistics functions to meet corporate objectives of reducing distribution costs and improving customer service. While innovation continued within logistics functions, it became increasingly difficult to realize major cost savings by applying what still were in essence traditional management techniques. Many corporations began to introduce a new approach to logistics operations and control, dubbed product channel management. Instead of seeking efficiency gains by managing discrete production, transport, warehousing and inventory control functions, product channel management targets higher product profitability by coordinating and controlling all business activities involved in getting



products to consumer markets. The product channel management organization evaluates cross-functional trade-offs to maximize overall product profitability, like targeting higher margin end markets while simultaneously minimizing product acquisition and delivery costs.

25. The adoption of product channel management strategies required substantial changes in corporate information systems, and increased responsibility for the materials management branch within a company. It became standard practice to establish expert teams to manage a channel for specific products. These expert teams focus on three key decision areas: customer requirements, product scheduling and inventory allocation, and end market profitability. In doing so, they aim at optimal returns on corporate production, processing, and distribution assets. Perhaps the most crucial operational change required for successful product channel management was to ensure the availability of and access to quality information to support decision-making.

26. Decision support systems such as Distribution Resource Planning, Materials Resource Planning, and Direct Product Profitability changed the information requirements and decision criteria in many firms, while arrangements like expert systems enhanced the range and focus of decision-making for a company (see Box 3 on page 14). These requirements implied internal company data bases, such as customer orders, store distribution or production schedules, and inventory. External data on shipment status and product availability or location from vendors, customers and carriers were also needed as important inputs in organizing to meet market or customer service requirements, evaluating channel cost trade-offs, and examining product profitability. By using these systems in concert, logistics

BOX 3

MATERIALS AND DISTRIBUTION RESOURCE PLANNING

The concept of using information as an asset to achieve competitive advantage has become widely accepted in trade and industry circles, which means that successful companies ascribe strategic value to what is essentially a process. Management of these companies have accepted that, because of the rapid rate of change in information technology they must constantly develop new systems just to stay even with their competitors. One of the most popular logistics applications of information technology today is the planning of a company's manufacturing process and distribution requirements. These programs are referred to as materials resource planning (MRP) and distribution resource planning (DRP) systems. MRP is designed to help schedule materials, labor, and equipment efficiently. DRP is an effort to establish optimal balances between high service levels and high inventory carrying costs. DRP is basically an extension of MRP and seeks to improve service without carrying higher average inventory by improving the field mix, coupling manufacturing more closely to distribution, and removing 'dead' stock.

Both MRP and DRP can improve corporate productivity in dramatic ways. Companies successfully implementing MRP reported savings of up to 25 percent in assembly and labor costs, and up to one-third reductions in inventory investment. Several companies indicated that they were investing in DRP systems because they expected the payback to be substantial. Their systems requirement analyses called for on-line, real-time networks to enable managers to know exact types and quantities of goods available, where they are located, and probable demand volume and location for those materials. The benefit of this kind of information crosses organizational lines, thereby permitting more integrated management decisions. Through these logistics management systems the required information became readily available for reducing inventory and transportation costs, while maintaining high levels of customer service.

Introduction of advanced information systems such as MRP and DRP does not, by itself, ensure profitability improvements. As with all introductions of new technology, successfully implementing these systems requires companies to also address changes in operating practices and management behavior, necessitated by the system. MRP and DRP systems and their integration can create 'information power' in that information is used to attain competitive advantage. They help operations managers run their business better than their competitors. Even when competitors have similar systems, each user derives somewhat different efficiency gains. The difference in benefits they derive comes from their rigor in setting policy and their discipline in using the system.

managers were able to achieve cost savings greater than those available under functional management procedures.

IV. DEVELOPMENTS IN INTERNATIONAL LOGISTICS MANAGEMENT PRACTICE The Experience Record and an Outlook for the 1990s

27. The 1,450 businesses in Canada, the United States, Japan, and seven West European countries (see also Chapter I) were surveyed with a view towards assessing to what extent they had incorporated logistical practice in their day-to-day operations, and how they had gone about organizing this. Of special interest was to find out how the application of logistics management concepts had affected their corporate performance, and particularly their cost structures and market shares. Of these businesses, 55 percent represented different categories of manufacturing, 15 percent were involved in trading, wholesaling, and retailing, and 30 percent belonged to the service industries (transport, warehousing, electronic data processing).

28. In addition to establishing an understanding of the experience record, attempts were also made to assess the thrust of already formulated strategies or perceived notions concerning the conditions which would have to be met for effective management of logistics functions in future years. Furthermore, there was the intention to determine projected trends in sourcing the supply of intermediate goods or final products, especially in developing countries. Because of still wide-spread performance problems among industries in developing countries, and pervasive infrastructure shortcomings, another objective was to find out how shippers hedge against the associated risks. Given that many businesses in industrialized countries are undergoing substantial corporate restructuring with the aim to shed all activities that are not essential to their core business, it was deemed important to ascertain whether further changes in the relation between shippers and the service industries are likely to develop. Finally, there was much interest in identifying the influence of technological change on the organization of logistics systems.

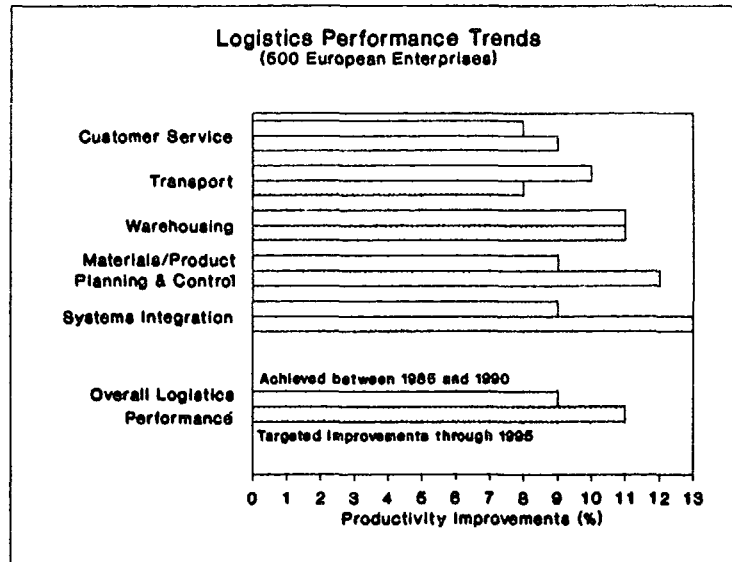
Performance Results

29. The extent to which logistics management concepts have reportedly been introduced into business operations varied. Almost none of the

interviewed parties was unaware of the facilitating role logistics could play in modern business administration, and its proven potential to induce major efficiency gains. A majority of the sampled businesses had experimented with logistical approaches, if to different extent. With only few exceptions, it was confirmed that they had been able to achieve productivity improvements and enhanced sales performance. Many of the success stories told demonstrated the broad impact of concerted logistics management on business performance. A few examples:

- * one percent reduction in logistics costs had the same effect on business performance as a ten percent increase in sales (Bosch-Siemens, Mitsubishi, General Motors);
- * product channel management has led up to 80 percent reduction in order cycle time, between 30 percent and 70 percent reduction in inventories, between 20 percent and 50 percent increase in productivity, and up to 30 percent reduction in delivered product costs (European industry association);
- * among our members, reductions in inventory between 30 percent and 50 percent have been experienced after having moved to EDI-driven systems. Reductions as high as 90 percent in premium freight have been realized through closer scrutiny of inventories and shorter cycle times. With goods available through faster electronic ordering, many firms have registered sales increases in the 50 percent range (U.S. industry association);
- * through improved logistics management we achieved 30 percent reduction in inventories which generated 20 percent decrease in storage and capital costs, which in turn resulted in about 35 percent increase in the returns on assets (Henkel International Chemicals);
- * by applying integrated logistics management, some industrial undertakings have achieved reductions up to 25 percent in the time needed to produce a good which enabled them to cut overall marketing costs by 20 percent (Boston Consulting Group review of changes in East European countries).

30. Additional gains were expected through further refinement of logistical processes, much of which had already been initiated. Interesting were the relative priorities given to different aspects of future logistics management organizations. More emphasis on demand monitoring, improving coordination between materials procurement and production planning in close relation with changing consumer preferences, better control arrangements, and above all more complete systems integration were named as key objectives.



31. The level and structure of logistics costs varied by industry. Although imperfect in its measurement, the concept of value added is roughly equivalent to controllable costs.⁴ As a proportion of value added, the logistics effort in manufacturing industries was reported to range from eight percent to 43 percent (see Table 1 on page 18). Logistics costs incurred in North American industries represented on average 22.5 percent of value added. Perhaps more importantly, these costs were equivalent to 70 percent of typical operating margins. By implication, a ten percent reduction in logistics costs yielded a seven percent improvement in operating margins. Similar observations were made among the business groups surveyed in the other countries.

32. The common break down of logistics expenditures reported by all parties demonstrated the heavy burden of inventories. The combined costs of inventory holding, including interest payments, losses due to spoilage and obsolescence, warehouse management and depreciation, and finally administrative overheads, typically amounted to more than 50 percent of total logistics costs. Transportation followed as a distant second, representing roughly 25 percent of expenditures related to logistics management.

⁴ Value added in manufacturing is the value of shipments less the value of purchased inputs, with appropriate adjustments for change in inventories and merchandise value.

TABLE 1

THE IMPACT OF LOGISTICS COSTS ON BUSINESS PERFORMANCE

<u>Type of Industry</u>	Percent Value- Added to Value of Shipments	Typical Operating Margin*	<u>Logistics Costs as a Percent of</u>	
			Value Added	Operating Margin*
Appliances	49	11	17	75
Apparel	49	12	8	33
Automotive	38	8	20	95
Building Materials	54	12	20	88
Chemical	48	18	39	48
Electrical	57	14	10	42
Metal	51	10	18	89
Food	29	9	36	117
Furniture	52	6	8	67
Lumber	41	14	26	76
Mechanical	55	15	12	43
Paper	43	14	30	92
Petroleum	17	17	43	42
Pharmaceutical	41	18	16	36
Rubber	50	9	11	61
Textile	40	10	10	40
Tobacco	47	19	8	21
<u>Average all Industries</u>	<u>43</u>	<u>14</u>	<u>23</u>	<u>70</u>

(* Operating margin = operating profit/operating revenues)

Source: Council of Logistics Management

Identified Key Requirements for effective Logistics Management

33. With few exceptions, the interviewed parties stressed the steadily growing importance of reliable communications networks and supporting software systems (see Table 2 on page 19). Without such infrastructure and system compatibility among industrial and trading partners, the efficiency potential of logistics could be tapped to a limited extent only. Trade and industry managers indicated that during the 1990s they will attach increasing weight to the availability of reliable telecommunications infrastructure and services before deciding to enter new markets or to liaise with new business partners.

TABLE 2

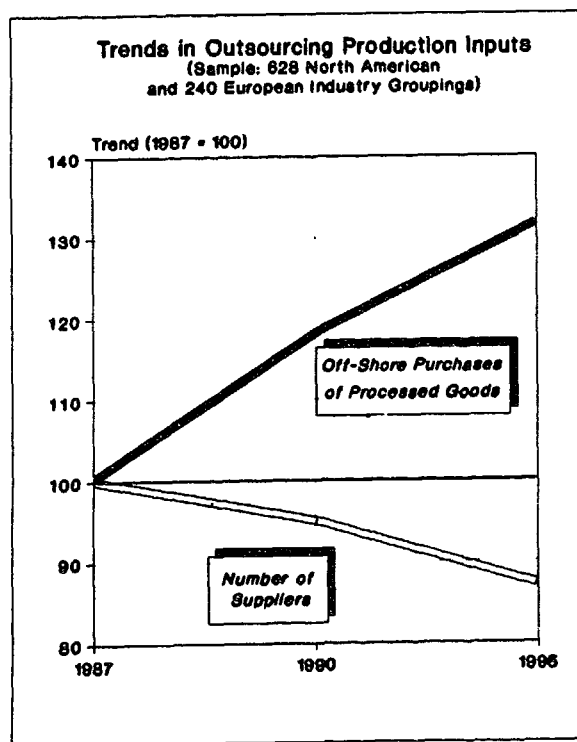
FACTORS WHICH INFLUENCE LOGISTICS PERFORMANCE
(as assessed by 580 Canadian and U.S. businesses)

	Mean Response Rating*		
	Manufacturing	Wholesaling	Retailing
Computer Support	4.17	4.24	4.38
Timely Information	4.16	4.02	4.07
Production Planning and Scheduling	4.04	n.a.	n.a.
Sales Forecasting Accuracy	3.83	3.64	3.73
Supplier Performance	3.79	3.50	3.48
Warehouse Productivity	3.49	3.94	3.98
Transportation Costs	3.48	3.75	3.74
Communications with Customers	3.45	3.57	3.28
Availability of Trained Personnel	3.41	3.47	3.38
Monitoring Methods	3.26	3.37	3.50
Communications with Suppliers	3.25	3.60	3.23
Vehicle Routing and Scheduling	3.24	3.44	3.35
Communications with Service Providers	3.13	3.03	3.06

(* 1 = no impact; 5 = very high impact)

Source: Michigan and Ohio State Universities.

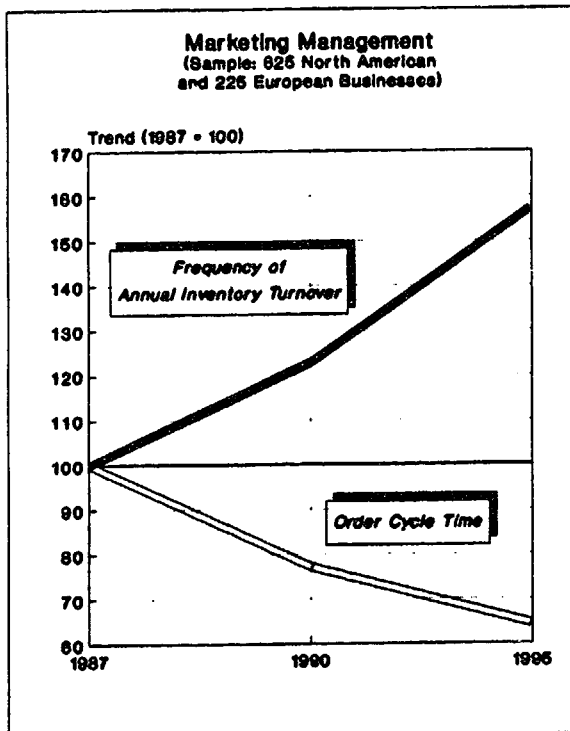
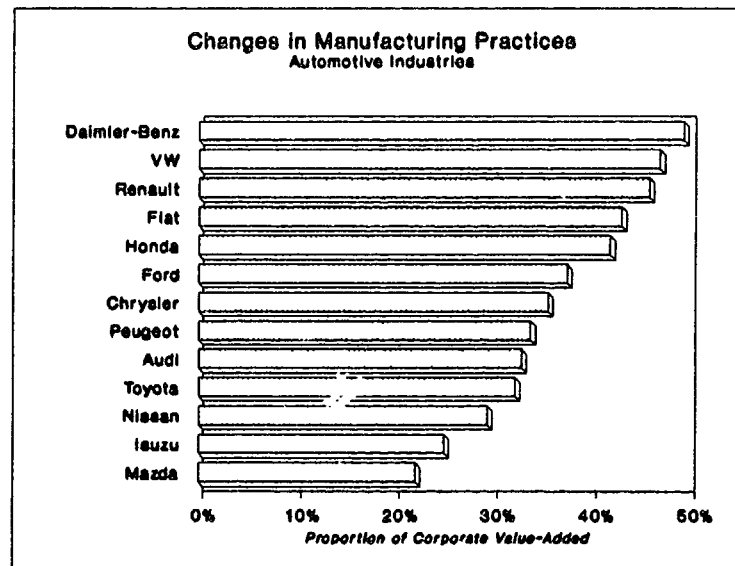
Projected Trends in External Sourcing



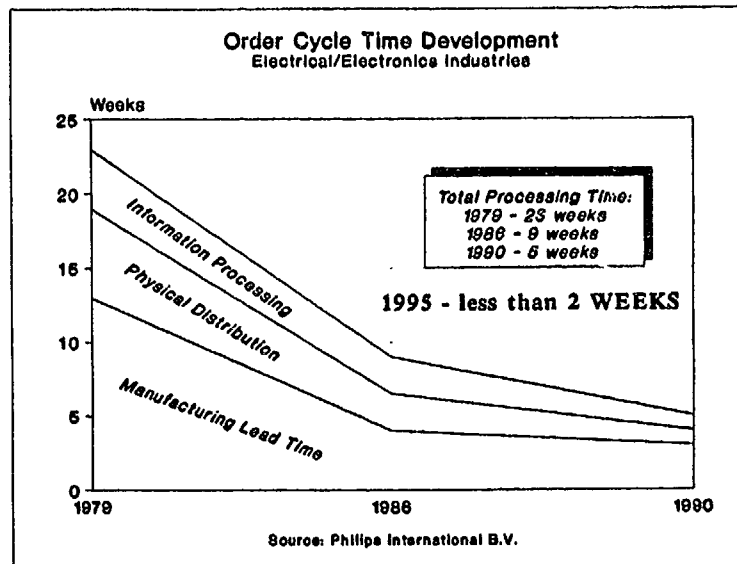
34. The survey established an outlook by key industries in North America and Europe as regards outsourcing trends during the 1990s. In the EEC countries, the proportion of outsourced manufacturing versus in-house production increased by 25 percent during the 1980s, and is projected to grow by another 30 percent through 1995. Substantial further growth is also predicted in the other two surveyed markets.⁵ The automotive industries have been a trendsetter in this respect, particularly in Japan where the proportion of corporate value-added has decreased to levels below 30 percent. But it is very important to recognize that many interviewed parties are forecasting contractions in the number of suppliers. The prime reason for this expectation is the perceived risk associated with reliability of their foreign partners, and

5 Japan and North America.

the risk generated by market uncertainties, which are essentially caused by demand fluctuations. The result has been that more and more companies have adopted the strategy of producing to order. About 70 percent of West European manufactures currently enter the sales markets on this basis.



35. Interviewed parties indicated that as market uncertainty increased, they often pressured their overseas suppliers to decrease order cycle time so that they could reduce their inventories. Key emphasis on order cycle management to allow increases in annual inventory turnover, and thus return on assets, was ubiquitously reported to drive business operations and to shape industrial relations, particularly with overseas suppliers, during the 1990s. Achieved reductions in order cycle times during the last ten years have been very significant in all three markets surveyed. Trends in the European electrical/electronics industries (see graph on page 21) provide an example of trends to be expected in other industries as well.

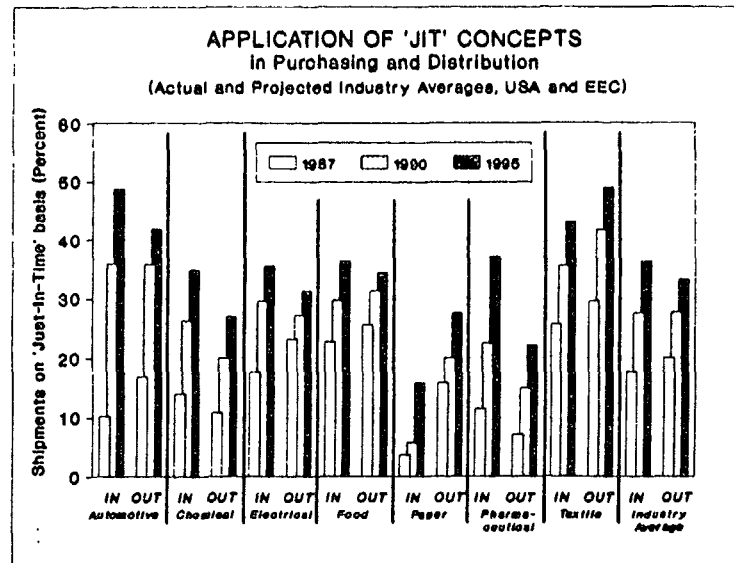


Strategies to hedge against Risk in International Trading

36. Industrial importers reported great concern about the ability of their overseas partners to meet their exacting logistics requirements. Limited or incompatible data interchange systems in developing countries ranked high in industries which increasingly depend on effective EDI arrangements to support their logistics organization. Representatives of the trading community expressed equal concern, which is why there is the general trend towards limiting the supply base and to forge strategic alliances with selected foreign suppliers. Several trade and industry managers indicated that they are considering single sourcing for major and, above all, critical inputs to their businesses. There was also expressed interest in long term relationships with preferred suppliers. Under such arrangement, the sharing of risk, information, and productivity improvement opportunities between partners in the logistics network is gradually becoming a standard operating policy.

37. Almost all parties interviewed stated that their JIT logistics systems center on the concept of 'zero defects' in the design of production and distribution arrangements.⁶ This concept implies rejects of less than three promille with supplied inputs to production and sales processes. As industries in the three markets continue to increase the application of JIT systems, eliminating product defects addresses an important issue in international commercial relations.

⁶ A 'zero defect' program is typically required for JIT-driven manufacturing and marketing systems, since JIT eliminates safety stock.



38. Survey findings suggest that the service quality of inbound logistics has greatly increased as a result of widespread adoption of the popular JIT management concept. There was much evidence of the expanding practice to assign delivery appointments at the time of issuing purchase orders. Several of the interviewed parties confirmed that customer expectations related to exact delivery time and high fill rates are growing. Because of shorter order cycle times and the practice of reducing inventories, average order sizes are getting smaller, and customers are placing increased emphasis on achieving maximum inventory velocity. The general attitude was that tighter schedules, shorter cycles, and smaller average orders mean more control. Strategic alliance with a selected overseas supplier is therefore seen as a major factor contributing to better control. A number of businesses reported that to some degree, the pressure on order cycle management is being reduced by the growing practice among importers to purchase 'free-on-board' (FOB) ex manufacturer's premises. There were clear indications of plans to further increase control over inbound transportation. According to the survey findings, about 40 percent of all overseas purchases are presently on FOB terms.⁷ After having moved all outsourced goods to FOB overseas purchase arrangements most companies experienced savings which ranged from 20 percent to 35 percent in their logistics expenditures.

39. Such procurement practices provide a clear indication that more and more overseas customers of industries in developing countries will dictate the shipping arrangements for outsourced supplies to manufacturing, or for consumer goods. The survey identified leading edge firms in industrialized as well as in developing countries that have been

⁷ Japanese businesses control almost all trade logistics transactions; they also sell in most cases on a 'cost, insurance, freight' (CIF) basis in the international markets.

innovatively applying effective marketing concepts, and information as well as transport technologies to dramatically revamp the way they exploit logistics, and thereby improved customer service (see Box 4 on page 24). Required smaller consignments through more frequent shipments have started to exert influence on modal choice and transport arrangements. Reliability in the service business equates to quality; the more flexible transport modes will expand their market shares.

Changing Relations between Shippers and the Service Industries

40. It has become apparent that new and innovative relationships between shippers and logistics service providers (transport, warehousing, EDI services) are developing at a rapid pace. In all three markets which were surveyed, firms have increased their use of outside logistical service suppliers. By common judgement, transport and warehousing are ideal for outsourcing. As regards future moves in this direction, transport services are considered as the strongest candidate for further outsourcing. Transport and warehousing involve considerable capital commitment. Many firms have well established management practices which place emphasis on taking advantage of external services, especially for peak or overflow demand situations.

41. Outsourcing these services has permitted maximum flexibility. Corporate managers reported that by using third party providers their firm could gain almost immediate entry into new markets and offer tailored customer service. Judging by the responses received, it appears as if everything from individual tasks to the total logistics function itself are being analyzed in the search for higher returns on assets. Even accounting functions, like factoring, are being outsourced.⁸

42. When moving into new markets, the risk of introducing new products is high. Many cases were reported in which the logistics functions had been outsourced not only to conserve capital but also to reduce risks and potential losses. If a product was not successful a firm could withdraw with minimum costs from short-term warehousing and transportation arrangements. Quite often, outsourcing reportedly became necessary in many parts of the world because local government restrictions required a certain percentage of domestic ownership. The service provider had to be a national, or the business partly owned by domestic interests. Another reason cited was required local expertise in customs regulations and domestic law. In such cases, third party logistics providers were chosen because these companies were ideally positioned to handle local market requirements.

⁸ Factoring, the trade with claims, has become a strong growth sector in Western Europe. In Germany, for instance, outsourced factoring services grew 13.5 percent in 1989.

BOX 4

INTERNATIONAL LOGISTICS CENTERS

During the last few years, a number of international logistics centers (ILCs) have been established by large shippers of high technology products, such as Digital Equipment Corporation (U.S.A.) and Sony (Japan), but also by associations that represent shippers of less sophisticated goods, such as the Handloom Products Council in Northern India. The motives for doing so vary, sometimes widely, but the intended effects are essentially the same - better customer service, improved productivity and thus, better financial performance.

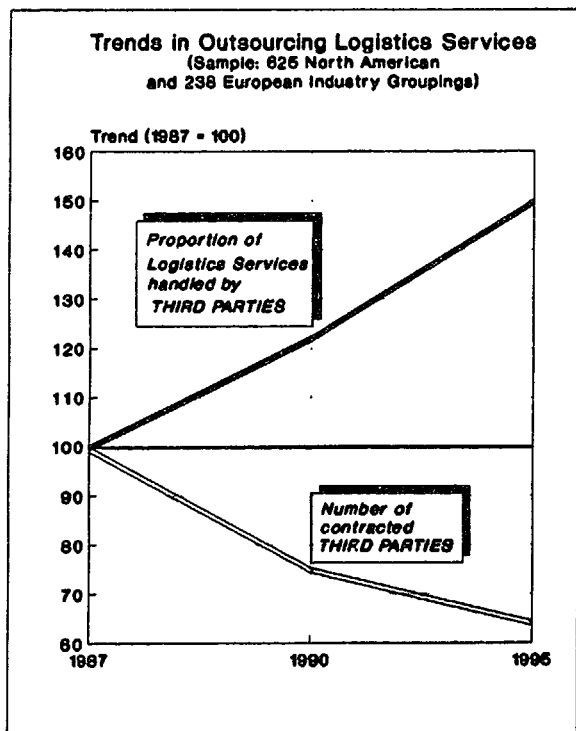
Digital Equipment Corporation uses its ILC, located in the Northeast United States, as an export distribution management facility. In the past, direct delivery from individual production units to customers overseas caused irregularities in shipment, relatively high distribution costs, and reduced accuracy of documentation due to lack of familiarity. All these tended to delay deliveries and implied considerable red tape at customs in the receiving countries. Digital concentrated in its ILC highly qualified distribution personnel to ensure proper export documentation, in-transit controls and shipment tracking. Close working relations with customs officials in destination countries facilitate entry clearance.

In Sony's logistics management philosophy, ILCs are the focal point in distribution arrangements. Each regional market, such as Northern Europe or the West Coast of the United States, is served out of a locally established ILC. But given its dispersed manufacturing base, Sony's ILCs function also in the reverse as consolidation centers for components and assembly, such as in Singapore. Products manufactured by all Sony factories in Southeast Asia are channeled through this ILC. The objective is to create single flows of Sony traffic from the region, which not only simplifies distribution control but also enables negotiation of more advantageous freight rates for larger volumes which are thus achieved.

The case of the Indian textile and fabric shippers is a demonstration of human ingenuity. The ever stricter demands of their European customers for on-time delivery could not any longer be met because of bureaucratic interventions which caused excessive shipment delays. In addition, seasonal demand fluctuations did not allow continuous full-capacity production. To overcome both problems the Handloom Products Council set up two ILCs in Europe which are continuously supplied throughout the year. Regional product marketing is handled through the management teams in each ILC. Due to these arrangements, the impact of clearance and handling delays in India could be minimized, and individual manufacturers can maintain a steady production. Customer service and market shares could be greatly enhanced through closer contacts and working relationships with buyers, and -very importantly- ensured timely and reliable supplies.

43. The survey revealed a trend of logistics outsourcing beyond the confines of shipper-third party relations. Traditional third parties themselves are outsourcing parts of their functions. As an example, outsourcing the maintenance function has produced higher returns on a firm's fleet. Several shippers reported that they have spun off portions of their business or created new firms to provide warehousing, transportation, or extensive combinations of logistics functions.⁹ These services are often provided back to the shipper on a competitive basis but the spin-off firm also markets itself to other businesses. Such decisions appear to be responsive to market opportunities and are a reflection of a firm's best estimate of how to provide or obtain efficient logistics services.

44. It was reported that to a significant degree, the popularity of outsourcing logistics service arrangements had been stimulated by the growing managerial emphasis on downsizing and flattening organizational structures. The goal is to achieve the benefits of a vertically integrated organization without the burden of ownership. The reasons given for considering 'make or buy' decisions were usually centered on asset productivity issues. In most cases, a contractual relation with a third party logistics service provider had substantially reduced the day-to-day transaction costs. The heavy capital commitment usually required to develop in-house capacity, together with the often high quality of meanwhile widely available for-hire services have combined to induce continuous outsourcing of logistics functions. Most parties indicated that they have plans to further shed activities that are not essential to their core business.



45. Many interviewed parties stated that reductions in inventory and tighter delivery schedules cannot be managed easily with multiple providers of logistics services. Each additional third party requires allocation of management time and effort to obtain consistency of service. Thus a concentration policy of establishing strategic relationships with fewer partners has been recognized to offer

9 A case in point are Caterpillar Logistics Services, Inc. which have been established to pursue such strategy by building on the strength of its parent company's highly developed world wide parts distribution network.

greater control and accountability. As the inventory and slack time are squeezed out of the logistics channels, continuous improvements in communication networks and very reliable transportation will be needed to maintain the linkages in minimum inventory systems.

46. Clearly, the new relationships have shed the narrow focus of conventional limitations and offer a wider range of options for shipper and logistics service provider. For the shipper it offers a range of value-added services that allows restructuring of global and domestic logistics channels from rigid capital-intensive ones to more flexible and variable cost-based channels. For the service provider it offers opportunity to build a more stable customer base with a more predictable and broader based cash flow. Since traditional logistics channel relationships have been viewed as a 'zero-sum game', the parties to the transaction often considered each other as adversaries. This view in turn carried over to the bargaining table and conditioned the trust between the two parties. As a result, there was little information sharing and even less mutual planning among the parties to the transaction. But the commitment of both parties to negotiate solutions will be a key element in the success of future partnerships.

47. It was reported that outsourcing the shippers' high labor cost tasks has led to increased use of public warehousing.¹⁰ The survey findings suggest that there is a recognizable trend toward longer term relationships between shippers and warehousemen. In response, the warehousing industry is changing to accommodate not only the functions of storage and order processing but also to offer additional services such as assembly and managing information exchange with other members of the distribution channel. It was frequently stated that assembly of parts, packaging and order processing are more efficiently done closer to the market. Break bulk and repacking operations by a warehouseman were identified as measures which enable shorter order cycles for customers. Interviewed parties indicated that the longer a firm can wait to commit to the final product configuration, the fewer the number of stock-keeping units that are necessary. There was broad consensus that shipping goods 'knocked down' as far as possible in the logistics channel saves transportation costs. This concept will find increasing application throughout the 1990s, and the role of the warehousing industry will expand accordingly.

The Effects of Technological Progress on Logistical Practice

48. The survey confirmed that technology is playing an increasingly important role in logistics channels, and this is likely to continue during the 1990s. Technology is a principal cause for, and has effects on the changing arrangements between shippers and logistics service providers. The

¹⁰ The term 'public warehousing' does not refer to ownership conditions, rather it implies facilities which are open to any user without restrictions.

application of innovative technologies is helping both shipper and third party to provide customers with better service. EDI, computer software, expert systems, satellite communications, and improved transport equipment will continue to facilitate the delivery of substantially enhanced services. With satellite tracking, management knows the location of vehicles or ships at any time to help plan workloads and advise customers about the current position of individual consignments. The ability to track shipments is becoming standard operating procedure in many modes. Views were expressed that the strategic use of technological advances provides a competitive advantage in the short run by improving service through better information flow and better fleet management. In the long run, many of these technologies will be essential for operation as the timing of deliveries attains ever greater importance.

49. As regards transport, a multimodal, worldwide perspective has emerged for both carriers and shippers. The opportunity for intermodal shipments is rated highly. Carriers and shippers are seeking to reduce costs while maintaining or increasing service. Since different modes offer different trade-offs concerning costs, speed, consistency and security, the view was expressed that one hedge for the shipper is to combine services to obtain an acceptable level of critical variables. With better tracking systems, modes can be switched to meet the shipper's needs.¹¹ Early warning of a late shipment permits contingency arrangements to keep the production lines running and customers supplied down the channel.

50. There was unequivocal evidence that the timeliness, accuracy and availability of information will increasingly constitute the single most important customer service dimension in the shipper-third party relationship. The quantity and quality of information exchanged between buyer, seller and third party have gained significant importance with the growing acceptance of JIT, 'quick response', and other asset-driven control systems. With the expansion of supply lines and demand points into global logistics networks, information requirements on the part of both the shipper and the third party are becoming more complex and more vital. A common assessment was that if the level of information provided by the third party is less than adequate, it will be disqualified as a potential partner.

51. Importantly, however, several interviewed parties indicated that the transmission and translation of different identification numbers for the same product is often a bigger problem than conducting international trade. Differences in classifications for the goods by various government agencies, buyers, sellers, and intermediaries have hampered the movement of goods. Reclassification of the same goods more than a dozen times from shipment dispatch to arrival is apparently not unusual. Incompatibility of buyer and seller EDI systems has been identified as a key conflict in international industrial and trade relations.

¹¹ A frequent problem was given as example. If goods are unexpectedly needed sooner than a contracted ship is scheduled to dock, they are off-loaded at the next intermediate port to be air-freighted to their final destination.

V. CONCLUDING OBSERVATIONS

52. The survey established that successful manufacturers and traders in current and future markets have a clear understanding of services which create value for customers and of the costs associated with providing such services. They have adopted and manage logistics as a value-added process. They are increasingly willing to use outside service providers. They have become apt to view relationships with service providers as strategic alliances. They are more significant users of data processing technology and enjoy a higher quality of information systems support. They actively seek to form partnerships with customers, and concentrate on building and maintaining long-term interactive relations. Close working relationships with customers facilitate the development of tailored services. Services are modified and customized in response to specific demands. They place a premium on consistent, high quality service. By providing reliable service, the bonds between buyer and seller are strengthened, and joint commitment to the relationship is intensified.

Leading Edge Logistics *The Theorems of Successful Companies*

- ✓ Exhibit an overriding Commitment to Customers
- ✓ Link Logistics to Corporate Strategy
- ✓ Develop integrated logistical Solutions
- ✓ Emphasize Planning
- ✓ Target optimum Service Levels
- ✓ Have a highly formalized logistical Process
- ✓ Place a Premium on Flexibility
- ✓ Reduce Inventories to maximum Extent
- ✓ Commit to Strategic Alliances
- ✓ Encompass a significant Span of functional Control
- ✓ Invest in state-of-the-art Information Technology
- ✓ Focus on financial Performance
- ✓ Employ comprehensive Performance Measurement

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